

WEATHER, FORECASTS, AND WARNINGS.

By H. C. FRANKENFIELD, Professor of Meteorology.

Alaska.—Pressure averaged above normal for the month. The more important lows occurred about the 1st–3d, 13th–14th, 20th–21st, and 26th–27th; and highs about the 6th–8th, 15th–19th, and 21st–24th. The subpermanent area of high pressure over the Pacific Ocean was north of its normal position during the latter half of the month.

Honolulu.—Pressure averaged slightly below normal for the month. Lows occurred on the 6th–7th, 10th, 13th, 26th, and 30th; and highs on the 1st, 3d–4th, 8th, 15th, 24th, and 27th–28th.

Iceland.—Pressure fluctuations were well marked. Lows occurred on the 4th, 9th, 11th, 14th–15th, 17th–18th, 20th, 24th, and 29th; and highs on the 2d, 5th, 13th, 16th–17th, 18th–19th, 22d, 26th, and last day of the month.

Azores.—Pressure during the month averaged near the normal, with an absence of marked changes, except on the 24th–25th. Lows occurred on the 8th, 11th, 15th–16th, 24th–25th, 26th–27th, and 29th; and highs on the 2d, 5th, 13th–14th, 17th–22d, and on the last of the month.

Siberia.—Storm movement over this area was erratic. Lows occurred about the 7th, 13th–14th, 18th, 23d–24th, and 28th; and highs about the 10th, 21st, 26th and 30th–31st. Severe storms were experienced on the Asiatic east coast on the 2d, 15th, and 28th.

Miscellaneous.—A cable report dated the 16th gave the information that London was suffering from a heat wave that had at that time persisted for several days.

In the United States the month opened with high pressure over the north Pacific coast and over the Lake region, while from the Plains States to the southern Plateau region pressure was relatively low. Temperatures were below normal, except over the Plains States.

The high-pressure area that was central over the Lake region on the morning of the 1st settled slowly southward and southeastward and dominated weather conditions in the Middle and South Atlantic States up to the 10th of the month. From the 1st to the 3d showers and thunderstorms were quite general over the Great Central Valleys and the East Gulf States, and in the Lake region during the 2d and 3d.

The following weekly forecast was issued Sunday, July 7:

Pressure distribution of the summer type continues over the Northern Hemisphere, and the weather for the coming week will therefore be generally warm east of the Rocky Mountains and over the interior middle and southern districts to the westward. The highest temperatures will probably be experienced in the Great Central Valleys and along the eastern slope of the Rocky Mountains. There will be no well-defined storms, and precipitation will be limited to local thunderstorms or heat showers that will not overspread extensive areas in any one day. In the South Atlantic and East Gulf States the showers will probably be less frequent than during the week just ended.

For the week ending July 8th, temperatures averaged decidedly above normal in northern districts from the Rocky Mountains eastward to the Lake Region. Temperatures were also above normal in New England, but

elsewhere they were below the seasonal average. Rain fall was copious over the Middle and East Gulf States, the South Atlantic States, and the Ohio Valley. During the week high temperatures occurred in the Lake region and suffering was reported from the heat in that region, as well as in the Middle Atlantic and New England States. On the 4th and 5th, at points in the far Southwest, temperatures were lower than had occurred during the first decade of July in 40 years.

Pressure remained relatively low over the Rocky Mountain region from the 1st to 8th. From the 8th to 11th a low-pressure area attended by showers and thunderstorms passed from the Plains States to northern New England. Showers occurred in the Middle and Eastern Gulf States and the weather remained unsettled for several days following in the New England and Middle Atlantic States.

From the morning of the 11th to the evening of the 18th a low-pressure area passed from the northern Rocky Mountain region to eastern Ontario, attended by showers and thunderstorms in central and northern districts.

From the 7th to 19th showers occurred almost daily in the South Atlantic and portions of the East Gulf States.

The following weekly forecast was issued Sunday, July 14:

Pressure over the Northern Hemisphere has become somewhat unstable, indicating that the weather during the coming week will be more changeable than during last week over the central and northern portions of the country. The week will open cool and showery over the Rocky Mountain region and the Northwest, followed by moderately warm and generally fair weather by the middle of the week, and by a return to cooler weather at the close. Over the Missouri and upper Mississippi valleys and the upper Lake region lower temperatures and showers will be experienced by Tuesday, continuing for a day or two, and followed by moderately warm and generally fair weather toward the end of the week. Over the Ohio Valley, the lower Lake region, and the northeastern districts warm and generally fair weather will continue during the first half of the week, followed by somewhat lower temperatures and local showers during the second half.

In the Gulf States and the Southwest warm and generally fair weather will continue, while in the South Atlantic States local thundershowers during the first half of the week will be followed by generally fair weather toward the close.

For the week ending July 15 temperatures averaged decidedly above normal from the southern Plains States to New England, in which latter district the greatest excess occurred. Temperatures were below the seasonal average over the Dakotas, Montana, Idaho, and Wyoming. High temperatures occurred over central and northern districts, causing much suffering as well as many deaths in some of the larger cities. Precipitation was well distributed during the week from the Missouri Valley and middle Gulf States eastward.

From the morning of the 13th a low passed from Saskatchewan to eastern Maine by the 16th, attended by showers and thunderstorms and cooler weather over northern districts. Severe local storms occurred in connection with this disturbance in portions of Wisconsin and in northwestern Ohio. It was followed by an area of high pressure, the most important so far of the month, which passed inland over the North Pacific States during the night of the 13th. By the 16th it had advanced to

eastern Ontario, causing decided changes to cooler weather in northern and central districts. By the morning following it had passed to northern New England with decreased intensity.

On the evening of the 14th there was an unsettled condition off the Georgia coast, and by the morning of the 15th pressure had fallen slightly over that region, and a maximum wind velocity of 36 miles from the east was reported from Charleston. Storm warnings were ordered from Charleston to Jacksonville, and special observations were called for, but no further development was noted. Heavy rains, however, occurred over Georgia and South Carolina, and a maximum wind velocity of 46 miles from the southeast was reported on the morning of the 16th from Charleston. This disturbance caused showers and thunderstorms over the East Gulf and South Atlantic States for several days following the 16th.

A low-pressure area of slight intensity that was over Alberta on the evening of the 15th passed eastward along the northern border and by the evening of the 18th was over the St. Lawrence Valley, having caused showers and thunderstorms over New England, the Middle Atlantic States, and the lower Lake region. During the next 24 hours it passed from the region of observations.

Showers were of almost daily occurrence in the East Gulf and South Atlantic States from the 1st to the 20th of the month.

A high-pressure area that was over Saskatchewan on the 17th moved to the southern Plains States by the 18th, and during the two days following passed to the Middle Atlantic coast.

The following weekly forecast was issued Sunday, July 21:

Moderate temperatures will prevail over the northern half of the country during the first half of the coming week, followed by warmer weather that will reach the extreme Northwest about Thursday and extend eastward to the Atlantic at the end of the week, at the same time continuing in the West. In the South the weather will be moderately warm.

The weather will be unsettled and showery Monday over the northern districts east of the Rocky Mountains, followed by generally fair weather during the remainder of the week, except in the Northwest where there will be a return to unsettled weather by Thursday or Friday. In the extreme central west and in the South the week will be generally fair except in the East Gulf and South Atlantic States where showers are probable during the second half of the week.

For the week ending July 22 temperatures averaged generally below normal over the northern half of the country from the Rocky Mountains to the Atlantic coast, being decidedly so from the northern Plains States to the upper Lake region. On the immediate Pacific coast temperatures averaged above normal, while elsewhere throughout the country they were moderate for the season. Precipitation occurred quite generally throughout the country.

An area of low pressure and showers passed from the Rocky Mountain region on the 20th eastward to the lower Lakes by the following morning and during the next 24 hours to New England. Showers and thunderstorms occurred over central and northern districts from the Plains States to New England, and precipitation was heavy in portions of western Pennsylvania. By the morning of the 23d the storm was over Nova Scotia, in which region it persisted until the 26th. Pressure was low over the Canadian maritime provinces until the end of the month.

The above-mentioned disturbance was followed by a high-pressure area of slight intensity that appeared over the Canadian northwest on the 20th and moved to the Eastern States by the 23d. During the next 36 hours it settled southward with decreased intensity.

A disturbance that was over Utah and one that was over Alberta on the morning of the 22d united and moved eastward to a position off Cape Hatteras by the 25th. It was attended by showers and thunderstorms in northern districts from the Plains States eastward.

This storm was followed by a high-pressure area of slight intensity that appeared over Saskatchewan on the 25th and moved slowly southeastward during the next three days with decreasing intensity.

A disturbance that was over Saskatchewan on the morning of the 27th passed rapidly eastward during the next 48 hours to Quebec, with decreased intensity, attended by showers and thunderstorms in northern districts. A great deal of damage was caused to telephone and telegraph wires on the 27th in Manitoba.

During the remainder of the month no well-defined high or low pressure area crossed the United States.

The following weekly forecast was issued Sunday, July 28:

Pressure distribution over the Northern Hemisphere indicates that the coming week will not be one of decided temperature changes over the United States. Warm weather will continue in the South and the Southwest, a moderate fall in temperature Monday over the upper Lake region, the upper Mississippi and the Missouri valleys will be followed by another rise Tuesday and Wednesday, and by little change thereafter. It will be warmer Monday over the northeastern districts, but no unusually warm weather is expected during the week. It will be cooler in the extreme Northwest by the end of the week.

There will be showers Monday from the southern upper Lake region and the upper Ohio Valley eastward into New York and New England, followed by generally fair weather during the remainder of the week, while in the West and Southwest fair weather will prevail. In the Northwest showers are probable toward the end of the week. In the South generally fair weather during the first half of the week will be followed by local showers during the second half.

For the week ending July 29 temperatures averaged above normal throughout the Great Plains region, Missouri Valley, and southern districts east of the Rocky Mountains. From the Ohio Valley and Lake region eastward over the Middle Atlantic and New England States temperatures were continuously below the seasonal average. Precipitation was deficient in central and southern districts and fairly well distributed over northern districts as well as in the southern Rocky Mountain region.

During the last day of the month precipitation occurred over the Ohio Valley and the eastern and central Gulf States.

No storm of tropical origin occurred during the month.

Average temperatures and departures from the normal.

| Districts. | Number of stations. | Average temperatures for the current month. | Departures for the current month. | Accumulated departures since Jan. 1. | Average departures since Jan. 1. |
|--------------------------------------|---------------------|---|-----------------------------------|--------------------------------------|----------------------------------|
| New England..... | 12 | 69.1 | +0.3 | -10.0 | -1.4 |
| Middle Atlantic..... | 15 | 73.9 | -0.6 | -11.4 | -1.6 |
| South Atlantic..... | 10 | 78.9 | -0.1 | -6.0 | -0.9 |
| Florida Peninsula ¹ | 9 | 81.7 | +0.4 | +1.5 | +0.2 |
| East Gulf..... | 11 | 79.9 | -0.4 | -11.5 | -1.6 |
| West Gulf..... | 14 | 83.3 | +1.3 | -14.9 | -2.1 |
| Ohio Valley and Tennessee..... | 14 | 76.2 | -0.6 | -19.6 | -2.8 |
| Lower Lakes..... | 11 | 70.8 | -0.9 | -24.2 | -3.5 |
| Upper Lakes..... | 13 | 67.2 | -0.9 | -25.1 | -3.6 |
| North Dakota ¹ | 9 | 66.2 | -1.9 | -8.9 | -1.3 |
| Upper Mississippi Valley..... | 14 | 75.0 | -0.4 | -24.3 | -3.5 |
| Missouri Valley..... | 12 | 70.6 | +1.0 | -14.2 | -2.0 |
| Northern slope..... | 9 | 65.4 | -2.7 | -10.2 | -1.5 |
| Middle slope..... | 6 | 76.7 | +0.8 | -17.4 | -2.5 |
| Southern slope ¹ | 8 | 82.7 | +2.3 | -10.1 | -1.4 |
| Southern Plateau ¹ | 10 | 76.9 | +3.3 | -3.9 | -0.6 |
| Middle Plateau ¹ | 10 | 68.7 | -2.6 | -4.9 | -0.7 |
| Northern Plateau ¹ | 10 | 66.2 | -2.9 | -1.7 | -0.2 |
| North Pacific..... | 7 | 61.3 | +0.1 | +7.5 | +1.1 |
| South Pacific..... | 7 | 63.7 | -1.8 | -1.5 | -0.2 |
| South Pacific..... | 4 | 69.4 | -0.4 | +2.9 | +0.4 |

¹ Regular Weather Bureau and selected cooperative stations.

Average precipitation and departures from the normal.

| Districts. | Number of stations. | Average. | | Departure. | |
|--------------------------------------|---------------------|----------------|-----------------------|----------------|---------------------------|
| | | Current month. | Percentage of normal. | Current month. | Accumulated since Jan. 1. |
| New England..... | 11 | 3.43 | 94 | -0.20 | -0.50 |
| Middle Atlantic..... | 15 | 3.72 | 86 | -0.60 | -0.70 |
| South Atlantic..... | 11 | 3.68 | 61 | -2.40 | +0.70 |
| Florida Peninsula ¹ | 9 | 6.22 | 103 | +0.20 | +11.20 |
| East Gulf..... | 11 | 5.76 | 110 | +0.50 | +13.30 |
| West Gulf..... | 10 | 0.95 | 29 | -2.30 | -1.60 |
| Ohio Valley and Tennessee..... | 14 | 5.53 | 137 | +1.50 | +3.30 |
| Lower Lakes..... | 10 | 3.53 | 106 | +0.20 | -0.10 |
| Upper Lakes..... | 13 | 4.07 | 133 | +1.00 | -1.70 |
| North Dakota ¹ | 9 | 4.30 | 159 | +1.60 | +1.10 |
| Upper Mississippi Valley..... | 15 | 4.17 | 114 | +0.50 | -1.80 |
| Missouri Valley..... | 12 | 2.66 | 69 | -1.20 | -3.10 |
| Northern slope..... | 9 | 2.54 | 155 | +0.90 | +0.30 |
| Middle slope..... | 6 | 1.87 | 63 | -1.10 | -0.60 |
| Southern slope ¹ | 8 | 1.54 | 52 | -1.40 | -3.20 |
| Southern Plateau ¹ | 9 | 1.76 | 129 | +0.40 | +0.60 |
| Middle Plateau ¹ | 11 | 1.07 | 188 | +0.50 | 0.00 |
| Northern Plateau ¹ | 10 | 1.27 | 189 | +0.60 | +1.00 |
| North Pacific..... | 7 | 0.97 | 126 | +0.20 | -3.00 |
| Middle Pacific..... | 7 | 0.02 | 100 | 0.00 | -3.40 |
| South Pacific..... | 4 | 0.04 | 100 | 0.00 | -0.30 |

¹ Regular Weather Bureau and selected cooperative stations.*Average relative humidity and departure from the normal.*

| Districts. | Average. | Departure from the normal. | Districts. | Average. | Departure from the normal. |
|--------------------------------|----------|----------------------------|-----------------------|----------|----------------------------|
| New England..... | 76 | -4 | Missouri Valley..... | 64 | -2 |
| Middle Atlantic..... | 73 | -1 | Northern slope..... | 64 | +12 |
| South Atlantic..... | 80 | 0 | Middle slope..... | 61 | +1 |
| Florida Peninsula..... | 78 | 0 | Southern slope..... | 54 | -5 |
| East Gulf..... | 81 | +3 | Southern Plateau..... | 44 | +6 |
| West Gulf..... | 70 | -4 | Middle Plateau..... | 44 | +12 |
| Ohio Valley and Tennessee..... | 77 | +8 | Northern Plateau..... | 49 | +8 |
| Lower Lakes..... | 72 | +3 | North Pacific..... | 77 | +12 |
| Upper Lakes..... | 77 | +5 | Middle Pacific..... | 63 | -3 |
| North Dakota..... | 75 | +9 | South Pacific..... | 65 | +1 |
| Upper Mississippi Valley..... | 72 | +4 | | | |

Average cloudiness and departure from the normal.

| Districts. | Average. | Departure from the normal. | Districts. | Average. | Departure from the normal. |
|--------------------------------|----------|----------------------------|-----------------------|----------|----------------------------|
| New England..... | 5.1 | 0.0 | Missouri Valley..... | 4.0 | -0.2 |
| Middle Atlantic..... | 4.6 | -0.3 | Northern slope..... | 5.2 | +1.5 |
| South Atlantic..... | 5.7 | +0.5 | Middle slope..... | 4.2 | +0.1 |
| Florida Peninsula..... | 5.2 | 0.0 | Southern slope..... | 3.3 | -1.2 |
| East Gulf..... | 5.8 | +0.4 | Southern Plateau..... | 3.4 | +0.1 |
| West Gulf..... | 3.3 | -0.5 | Middle Plateau..... | 4.5 | +1.4 |
| Ohio Valley and Tennessee..... | 6.0 | +1.4 | Northern Plateau..... | 4.5 | +1.8 |
| Lower Lakes..... | 5.0 | +0.5 | North Pacific..... | 5.5 | +0.9 |
| Upper Lakes..... | 5.6 | +1.0 | Middle Pacific..... | 3.9 | +0.4 |
| North Dakota..... | 4.3 | -0.1 | South Pacific..... | 3.4 | +0.6 |
| Upper Mississippi Valley..... | 4.6 | +0.3 | | | |

Data, maximum wind velocities.

| Stations. | Date. | Velocity. | Direction. | Stations. | Date. | Velocity. | Direction. |
|---------------------------|-------|-----------|------------|-----------------------------|-------|-----------|------------|
| Denver, Colo..... | 14 | 55 | ne. | Nashville, Tenn..... | 15 | 53 | se. |
| Eastport, Me..... | 22 | 54 | e. | Pierre, S. Dak..... | 8 | 59 | w. |
| El Paso, Tex..... | 15 | 50 | ne. | Point Reyes Light, Cal..... | 1 | 52 | nw. |
| Lincoln, Nebr..... | 9 | 54 | nw. | Do..... | 2 | 62 | nw. |
| Minneapolis, Minn..... | 12 | 80 | nw. | Do..... | 20 | 50 | nw. |
| Mount Tamalpais, Cal..... | 16 | 60 | nw. | St. Paul, Minn..... | 12 | 62 | n. |
| Do..... | 20 | 59 | nw. | Walla Walla, Wash.. | 20 | 52 | sw. |
| Do..... | 21 | 58 | nw. | | | | |
| Do..... | 22 | 62 | nw. | | | | |